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Permafrost Thaw Related Surface Displacement in Qaanaaq Village, NW Greenland

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The infrastructure of the village Qaanaaq in NW Greenland suffers from surface displacement due to permafrost thawing. The typical gabble-roofed single-family wooden houses in Qaanaaq are constructed on shallow wooden foundations, which suffer from active layer slope movement and differential settlements from seasonal freeze-thaw cycles.
The aim of this investigation is to assess surface displacements in the Qaanaaq area of NW Greenland from a combination of remote sensing data and in situ measurements.
We have used a number of different techniques and data sources to assess ground movement around the settlement and neighbouring region. This allows a range of temporal and spatial scales to be addressed in the study as well as providing some means of cross-validation of results.
The study uses Sentinel-1 differential radar interferometry, DEM-differencing, long term GNSS survey, ground observations and base maps of the town to determine and validate surface displacements.
Assessment is challenging due to the lack of stable benchmarks in a region where it is likely that surface displacement is occurring non-linearly over a wider area. However, first results indicate that surface displacements occur in order of 3 - 15 cm/yr in the region.